CLAIMS

What is claimed is:

1. A laser processing method, comprising:

a beam-splitting step for splitting a single laser beam into a plurality of laser beams including a zero-order diffracted laser beam, by diffracting the single laser beam by a diffractive optical element;

a direction setting step of turning an array of focused beam spots obtained from the plurality of laser beams about the zero-order diffracted laser beam to align the array of focused beam spots in accordance with a direction of an array of a plurality of processing points of a work;

an interval setting step for causing an interval between the focused beam spots in the array to be in agreement with an interval between the plurality of processing points in the array, by adjusting the distance from the diffractive optical element to the work; and

a processing step for increasing the intensity of the plurality of laser beams to such an intensity that is necessary to process the work, and processing the work by simultaneously irradiating the plurality of processing points with the focused beam spots in the array having the direction and the interval determined in the preceeding steps.

2. A laser processing method according to claim 1, wherein the respective setting steps are executed after the zero-order diffracted laser beam, which has passed through the diffractive optical element, is caused to be in agreement with one of the processing points.

3. A laser welding method, comprising:

a beam-splitting step for splitting a single laser beam into a plurality of laser beams including a zero-order diffracted laser beam by diffracting the single laser beam by a diffractive optical element;

a direction setting step of turning an array of focused beam spots obtained from the plurality of laser beams about the zero-order diffracted laser beam in accordance with a direction of an array of a plurality of welding points at which parts mounted on a printed circuit board are welded to the board;

an interval setting step for causing an interval between the focused beam spots in the array to be in agreement with an interval between the plurality of welding points in the array by adjusting the distance from the diffractive optical element to the board; and

a connecting step for increasing the intensity of the plurality of laser beams to such an intensity that is necessary for welding, and connecting the parts to the board by simultaneously irradiating the plurality of welding points with the focused beam spots in the array having the direction and the interval determined in the preceeding steps.

4. A laser welding method according to claim 3, wherein the respective setting steps are executed after the zero-order diffracted laser beam, which has passed through the diffractive optical element, is caused to be in agreement with one of the welding points.

5. A laser welding method according to claim 3, wherein the connection is made by welding using a solder.

6. A laser processing apparatus comprising:

a laser oscillator;

a diffractive optical element for splitting a single laser beam emitted from the laser oscillator into a plurality of laser beams that include a zero-order diffracted laser beam and are used in processing;

a turning unit for setting the diffractive optical element at a a desired angle by turning it about the optical axis thereof; and

a moving unit for positioning the diffractive optical element on the optical axis by sliding it over a desired distance along the optical axis.

7. A laser processing apparatus according to claim 6, comprising a focusing unit for focusing a laser beam incident on the diffractive optical element.

8. A laser processing apparatus according to claim 6, comprising an optical axis positioning unit for moving the laser beam incident on the diffractive optical element together with the diffractive optical element in a direction orthogonal to across the optical axis.

9. A laser processing apparatus according to any of claim 6, comprising a solder dispenser for supplying solder to the laser irradiation points on a work.